

IN THE CLAIMS:

Claims 23 through 27 have been withdrawn by the Examiner.

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1. **(Once amended)** An x-ray device, comprising:
 - (a) a vacuum enclosure;
 - (b) an integral cathode disposed in said vacuum enclosure, said integral cathode including an emitter capable of discharging electrons, said emitter having a predetermined geometrical configuration oriented to cause at least some of the discharged electrons to converge at a focal spot;
 - (c) a power source connected to said emitter so that transmission of power from said power source to said emitter causes said emitter to discharge electrons; and
 - (d) a target anode disposed in said vacuum enclosure and having a target surface positioned to receive at least some of the electrons discharged by said emitter.

2. **(Original)** The x-ray device as recited in Claim 1, wherein said focal spot is located proximate to said target surface of said target anode.

3. **(Original)** The x-ray device as recited in Claim 1, further comprising a support cartridge, said support cartridge receiving said emitter and maintaining said emitter in a desired configuration.

4. **(Original)** The x-ray device as recited in Claim 3, wherein said support cartridge facilitates substantial electrical isolation of said integral cathode.

5. **(Once amended)** In an x-ray tube comprising a vacuum enclosure having disposed therein a target anode with a target surface, an integral cathode disposed in the vacuum enclosure and being spaced apart from the target surface of the target anode, the integral cathode comprising:

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- (a) an emitter capable of discharging electrons, said emitter having a predetermined geometrical configuration oriented to cause at least some of the discharged electrons to be directed at the target surface of the target anode and converge at a focal spot; and
 - (b) a support cartridge, said support cartridge providing structural support for said emitter.

6. **(Original)** The integral cathode as recited in Claim 5, wherein said focal spot is proximate to the target surface of the target anode.

7. **(Once amended)** The integral cathode as recited in claim 5, wherein at least a portion of said emitter is received in said support cartridge in a manner so as to retain said emitter in the predetermined geometrical configuration.

8. **(Once amended)** The integral cathode as recited in claim 5, wherein said predetermined geometrical configuration provides an emitter having a cross-section substantially in the shape of an arc so that a concave side of said emitter is directed towards the target surface of the target anode.

9. **(Original)** The integral cathode as recited in Claim 5, wherein said emitter is substantially composed of a refractory metal.

10. **(Original)** The integral cathode as recited in Claim 5, wherein said emitter is composed of a combination of tungsten and rhenium.

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11. **(Original)** The integral cathode as recited in Claim 5, wherein said support cartridge comprises at least one electrically conductive portion, said electron beam and said focal spot being selectively manipulated by application of a voltage to said at least one electrically conductive portion.

12. **(Original)** The integral cathode as recited in Claim 5, wherein said emitter comprises a plurality of subsidiary emitting portions.

13. **(Original)** The integral cathode as recited in Claim 12, wherein said plurality of subsidiary emitting portions are integral with each other.

14. **(Original)** The integral cathode as recited in Claim 5, wherein said emitter comprises at least two subsidiary emitting portions not parallel to each other, said at least two subsidiary emitting portions cooperating to facilitate said convergence of said at least some discharged electrons at said focal spot.

15. **(Original)** The integral cathode as recited in Claim 14, wherein said at least two subsidiary emitting portions are integral with each other.

16. **(Original)** The integral cathode as recited in Claim 14, wherein said at least two subsidiary emitting portions are disposed in a substantially "V" shaped configuration.

17. **(Original)** The integral cathode as recited in Claim 5, wherein said emitter is substantially bowl shaped.

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18. **(Original)** The integral cathode as recited in Claim 5, wherein a plurality of cut out portions are defined in said emitter, said plurality of cutout portions collectively defining a an electrical current path.

19. **(Original)** The integral cathode as recited in Claim 5, wherein said support cartridge facilitates substantial electrical isolation of the integral cathode.

20. **(Original)** The integral cathode as recited in Claim 19, wherein said support cartridge is substantially composed of iron, said iron being cataphoretically coated so that at least a portion of said support cartridge is rendered electrically non-conductive.

21. **(Original)** The integral cathode as recited in Claim 19, wherein said support cartridge is electrically non-conductive.

22. **(Original)** The integral cathode as recited in Claim 21, wherein said support cartridge is substantially composed of ceramic.

23. through 27. **(Withdrawn by Examiner)**

28. **(Previously added)** In an x-ray tube comprising a vacuum enclosure having disposed therein a target anode with a target surface, a cathode disposed in the vacuum enclosure and being spaced apart from the target surface of the target anode, the cathode comprising:

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- (a) an emitter capable of discharging electrons, said emitter having two or more non-parallel emitting surfaces oriented so as to cause at least some of the discharged electrons to be directed at a focal spot on the target surface of the target anode; and
 - (b) a support cartridge, said support cartridge providing structural support for said emitter.

29. **(Previously added)** In an x-ray tube comprising a vacuum enclosure having disposed therein a target anode with a target surface, a cathode disposed in the vacuum enclosure and being spaced apart from the target surface of the target anode, the cathode comprising:

- (a) an emitter having at least one emission surface capable of discharging electrons towards a focal spot on the target surface of the target anode; and
- (b) a support cartridge, said support cartridge retaining said emitter in a manner such that the at least one emission surface assumes a predetermined geometric shape.

30. **(Previously added)** An x-ray device, comprising:

- (a) a vacuum enclosure;
- (b) an integral cathode disposed in said vacuum enclosure and including an emitter that serves as the primary electron source for the x-ray device, said emitter substantially comprising an emissive material and a geometry of said emitter being such as to cause at least some electrons discharged by said emitter to converge at a focal spot;
- (c) a power source configured for communication with said integral cathode; and

(d) a target anode disposed in said vacuum enclosure and having a target surface positioned to receive at least some electrons discharged by said emitter.

31. **(Previously added)** The x-ray device as recited in claim 30, wherein said emitter substantially comprises a single piece of emissive material.

32. **(Previously added)** The x-ray device as recited in claim 30, wherein said emitter comprises a plurality of subsidiary emitting portions.

33. **(Previously added)** The x-ray device as recited in claim 32, wherein at least one of said subsidiary emitting portions is substantially planar.

34. **(Previously added)** The x-ray device as recited in claim 32, wherein at least one of said subsidiary emitting portions substantially comprises a geometry selected from the group consisting of: parabolic sections; and spherical sections.

35. **(Previously added)** The x-ray device as recited in claim 30, wherein said emitter defines at least one cutout portion.

36. **(Previously added)** The x-ray device as recited in claim 30, wherein said geometry of said emitter substantially comprises a parabolic section.

37. **(Previously added)** The x-ray device as recited in claim 30, wherein said geometry of said emitter substantially comprises a spherical section.

38. **(Previously added)** The x-ray device as recited in claim 30, wherein said geometry of said emitter substantially comprises an angular bend.

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39. **(Previously added)** The x-ray device as recited in claim 30, wherein said emissive material of said emitter substantially comprises a refractory metal.

40. **(Previously added)** The x-ray device as recited in claim 30, wherein said emissive material of said emitter substantially comprises a combination of tungsten and rhenium.

41. **(Previously added)** The x-ray device as recited in claim 30, further comprising a support cartridge wherein at least a portion of the emitter is positioned.

42. **(Previously added)** The x-ray device as recited in claim 41, wherein said support cartridge facilitates definition of said geometry of said emitter.

43. **(Previously added)** The x-ray device as recited in claim 41, wherein said support cartridge substantially comprises an electrically non-conductive material.

44. **(Previously added)** In an x-ray device having a vacuum enclosure wherein is substantially disposed a target anode that includes a target surface, an integral cathode

substantially disposed in said vacuum enclosure in a spaced apart configuration with respect to said target surface of said target anode, the integral cathode comprising:

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- (a) an emitter that serves as the primary electron source for the x-ray device, said emitter substantially comprising an emissive material and a geometry of said emitter being such as to cause at least some electrons discharged by said emitter to converge at a focal spot; and
 - (b) a support cartridge wherein at least a portion of the emitter is positioned.

45. **(Previously added)** The integral cathode as recited in claim 44, wherein said emitter substantially comprises a single piece of emissive material.

46. **(Previously added)** The integral cathode as recited in claim 44, wherein said emitter comprises a plurality of subsidiary emitting portions.

47. **(Previously added)** The integral cathode as recited in claim 46, wherein at least one of said subsidiary emitting portions is substantially planar.

48. **(Previously added)** The integral cathode as recited in claim 46, wherein at least one of said subsidiary emitting portions defines a geometry selected from the group consisting of: parabolic sections; and spherical sections.

49. **(Previously added)** The integral cathode as recited in claim 44, wherein said emitter defines at least one cutout portion.

50. **(Previously added)** The integral cathode as recited in claim 44, wherein said geometry of said emitter substantially comprises a geometry selected from the group consisting of: parabolic sections; and spherical sections.

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51. **(Previously added)** The integral cathode as recited in claim 44, wherein said emitter substantially comprises a refractory metal.

52. **(Previously added)** The integral cathode as recited in claim 44, wherein said support cartridge facilitates definition of said geometry of said emitter.

53. **(Previously added)** In an x-ray device having a vacuum enclosure wherein is substantially disposed a target anode that includes a target surface, an integral cathode substantially disposed in said vacuum enclosure in a spaced apart configuration with respect to said target surface of said target anode, the integral cathode comprising:

- (a) an emitter that serves as the primary electron source for the x-ray device, said emitter substantially comprising a single piece of emissive material and a geometry of said emitter being such that said emitter includes convex and concave sides, said concave side of said emitter being positioned such that at least some electrons discharged by said emitter converge at a focal spot proximate the target surface of the target anode; and
- (b) a non-electrically conductive support cartridge wherein at least a portion of the emitter is positioned, said support cartridge facilitating definition of said geometry of said emitter.

54. (Previously added) The integral cathode as recited in claim 53, wherein said geometry of said emitter is selected from the group consisting of: parabolic sections; and spherical sections.

Concluded
C1 55. (Previously added) The integral cathode as recited in claim 53, wherein said emitter defines at least one cutout portion.

56. (Previously added) The integral cathode as recited in claim 53, wherein said emitter substantially comprises a refractory metal.
